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PRINTING APPARATUS FOR DISK LABEL AND RECORDING APPARATUS FOR
OPTICAL DISK

[Disuku no reberu innsatsusouchi oyobi hikaridisuku no
johokirokusouchi]

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(54) [Title of the Invention]

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PRINTING APPARATUS FOR DISK LABEL AND RECORDING APPARATUS
FOR OPTICAL DISK

[Claims]

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[Claim 1]

A label-printing device for a disk, comprising:

a disk rotation means to rotate a disk to a predetermined
rotational speed;

an inkjet device whose inkjet nozzle is fixed facing against
the label printing surface of the disk rotated by the disk
rotation means;

a data input means to input a character of a printing
object;

a data conversion means to convert the input data by the
data input means into control data for the inkjet device along
the circumference direction of the disk;

a driving-control means to control the inkjet device
following the control data for the inkjet device.

[Claim 2]

The disk label-printing device of Claim 1, wherein the disk
label-printing device has an aperture part for maintenance
including replacing the inkjet nozzle of the inkjet device.

Number in the margin indicates pagination in the foreign text.

[Claim 3]

An information-recording device for an optical disk, equipped with a disk rotation means to rotate an optical disk and a laser unit for recording information onto the rotating optical disk by irradiating a laser beam from the laser unit following the information of a recorded subject, comprising:

a disk rotation means to rotate a disk to a predetermined rotational speed;

an inkjet device whose inkjet nozzle is fixed facing against the label printing surface of the disk rotated by the disk rotation means;

a data input means to input a character of a printing object;

a data conversion means to convert the input data by the data input means into control data for the inkjet device along the circumference direction of the disk;

a driving-control means to control the inkjet device following the control data for the inkjet device.

[Claim 4]

The optical disk information-recording device of Claim 1 [sic. 3], wherein the optical disk information-recording device has an aperture part for maintenance including replacing the inkjet nozzle of the inkjet device.

[Detailed Description of the Invention]

[0001] [Field of Industrial Utilization]

This invention relates to a disk label-printing device and an optical disk information-recording device that integrates the disk label-printing device.

[0002] [Prior Arts]

In a conventional method of printing a label on the surface of an optical disk such as a compact disk, a form is made based on a printing design and then a series of printing processes is proceeded.

[0003] [Problems that the Invention is to Solve]

With the conventional method, it is necessary to use a designated printing machine for label-printing and also to make a form for each label, and changing a design for a small number of labels or each label is not feasible due to a large cost increment. Furthermore, since the printing condition requires adjustment in a series of processes whenever a form is replaced for each label design, it takes an extremely long time to print labels of several different designs.

[0004]

In order to solve the above problems, the inventors disclosed a disk label-printing device and an information-recording device that perform label-printing routines in a series of manufacturing processes without using a form.

[0005]

As described in Claim 1, this disk label-printing device is comprised of a disk rotational means to rotate a disk at a predetermined rotational speed; an inkjet device placed against the disk label-printing device rotated by the disk rotational means; a data input means to input printing data such as a character and a picture; a data conversion means to convert printing data, which is input by the data input means, into another form so that the data may be printed along the circumference direction of the disk; and an inkjet driving-control means to control the operation of the inkjet device following the inkjet control data.

[0006]

The optical disk information-recording device, which has a laser unit and a disk rotational means to rotate an optical disk and records information onto the rotating optical disk by irradiating the laser beam to the optical disk following the information of the recorded subject, integrates the aforementioned label-printing device.

[0007]

In the disk label-printing device or the information-recording device described above, printing data of a printing object such as a character and a picture is input by the data input means, and a disk for label printing is rotated at a

predetermined rotational speed by the disk rotational means. The printing data, which is input by the data input means, is converted into inkjet control data along the circumference direction of the disk by the data conversion means, and the operation of the inkjet device is controlled by the inkjet control data. The inkjet device, configured against the label printing surface of the disk, jets ink particles and prints a label of the printing data on the label printing surface by the inkjet control data described above.

[0008]

Therefore, a form for each label design is not required, and it is easy to produce or modify a design for a small number of labels or a single label, and a disk with a label of an original design may be offered at a low cost. Furthermore, an optical disk information-recording device integrated with the label-printing device implements an advantage where label-printing and information-recording may be carried out simultaneously in a series of manufacturing processes without taking a long time.

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[0009] [Problems that the Invention is to Solve]

However, the disk label-printing device and the optical disk information-recording device disclosed by the inventors in the prior art are configured to have an inkjet device which is movable along the radial direction for printing various labels.

Due to this configuration, the physical size of the device itself is large and its cost is high.

[0010]

Considering the above problems, this invention discloses a disk label-printing device and an optical disk information-recording device where the inkjet nozzle is fixed in a position in order to perform simple label-printing routines at a low cost.

[0011] [Means for Solving the Problems]

In order to solve the aforementioned problems, this invention discloses a disk label-printing device comprising a disk rotational means to rotate a disk at a predetermined rotational speed; an inkjet device whose inkjet nozzle is placed facing against the disk label-printing device rotated by the disk rotational means; a data input means to input printing data such as a character and a picture; a data conversion means to convert printing data, which is input by the data input means, into another form so that the data may be printed along the circumference direction of the disk; and an inkjet driving-control means to control the operation of the inkjet device following the inkjet control data as described in Claim 1.

[0012]

In Claim 2, this invention discloses a disk label-printing device, described in Claim 1, with an additional aperture part for maintenance including replacing the inkjet nozzle of the

inkjet device.

[0013]

As described in Claim 3, this invention also discloses an optical disk information-recording device, which has a disk rotational means to rotate an optical disk, and a laser unit to irradiate a laser beam following the information of the recorded subject for recording information onto the optical disk, comprising the rotational speed controlling means to regulate the rotational speed of the optical disk at a predetermined rotational speed; an inkjet device whose inkjet nozzle is placed facing against the printing surface of the optical disk rotated by the rotational means; a data input means to input printing data such as a character and a picture; a data conversion means to convert a printing data input by the data input means into another form so that the data may be printed along the circumference direction of the disk; and an inkjet driving-control means to control driving the inkjet device following the inkjet control data.

[0014]

In Claim 4, this invention proposes an optical disk information-printing device, described in Claim 3, with an additional aperture part for maintenance including replacing the inkjet nozzle of the inkjet device.

[0015] [Effects of the Invention]

According to Claim 1 of this invention, a printing data of an printing object such as a character and a picture is input by the data input means, and a disk for label printing is rotated at a predetermined rotational speed by the disk rotational means. An inkjet nozzle is fixed facing against the label printing surface of a disk rotated by the disk rotation means. Furthermore, the printing data, which is input by the data input means, is converted into an inkjet controlling data along the circumference direction of the disk by the data conversion means, and the operation of the inkjet device is controlled by the inkjet controlling data. Ink particles are jetted from the inkjet device by the inkjet controlling data to print a label according to the printing data such as circular lined characters.

[0016]

According to Claim 2 of this invention, replacing the inkjet nozzle and refilling the ink into the inkjet device are carried out through the aperture part for maintenance.

[0017]

According to Claim 3 of this invention, the inkjet nozzle is fixed facing against the label-printing surface of an optical disk rotated by the rotational means. After or before recording the information onto an optical disk, the rotational speed of the optical disk reaches a predetermined rotational speed.

Meanwhile, printing data of a printing object such as a character and a picture is input by a data input means, and printing data, which is input by the data input means, is converted into inkjet control data along the circumference direction of the disk.

Furthermore, the operation of the inkjet device is controlled by the inkjet control means following the inkjet control data. Ink particles are jetted from the inkjet device by the inkjet control data to print a label according to the printing data, a label of circular lined characters for instance.

[0018]

According to Claim 4 of this invention, replacing the inkjet nozzle and refilling the ink into the inkjet device are carried out through the aperture part for maintenance.

[0019] [Working Examples]

Figures 1 and 2 show an outlook of an optical disk information-recording device as an embodiment of this invention and its block diagram, respectively. In these figures, the unit [1] is an optical disk such as a compact disk. The unit [2] is the main body of the information-recording device ("the main body," hereafter) whose front panel has the insertion slot [22] of the tray [21] containing the optical disk [1] and the switch panel [23] configured with several touch-switches.

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There is the aperture part [25] for maintenance together with an open/close lid [25a] on the upper part of the tray [21] inside

the main body [2], and refilling the ink into the inkjet device [24] and replacing the inkjet nozzle [24a] may be proceeded through the aperture part. As is well known to those skilled in the art, the inkjet device [24] jets ink particles to the desired position on the printing surface through the nozzle [24a] following the driving-control signal, and this embodiment utilizes the charge controlling method or the impulse pressure driving method. Furthermore, the nozzle [24a] is detachable and fixed at a predetermined position facing against the printing surface of a label of the optical disk [1] confined in the main body [2], i.e., fixed to the support pillar [24b] facing against the upper rim of the optical disk [1], for instance.

[0020]

The main body [2] contains the spindle motor [3] to rotate the optical disk [1], the pickup [4] comprised of a semiconductor laser and an photoelectric converter, the driving switch [5], the information-recording unit [6], and the label-printing unit [7].

[0021]

The optical disk [1] is inserted into or ejected out of the main body [2] with the tray [21], and rotated with the label surface upward by the spindle motor [3] configured underneath the optical disk. There is the movable pickup [4] at a predetermined position underneath the optical disk [1]. Either the information-recording unit [6] or the label-printing unit [7]

outputs the rotation-control signal to the spindle motor [3] through the switch [5].

[0022]

The information-recording unit [6] has the information recording control circuit [61], the information input interface [62], the rotation-control circuit [63], and the TOC information memory [64]. The information-recording control unit [61] has a CPU for receiving the information of the recorded media through the information interface [62] drives the spindle motor [3] through the rotation control circuit according to the switch signal from the switch panel [23] drives the pickup unit [4] by the received information and records the information onto the optical disk [1]. When recording the information onto the optical disk [1] is completed, the information-recording control unit [61] records the contents of the information into the TOC information memory as TOC information.

[0023]

The label-printing unit [7] has the central control circuit [71], the rotation control circuit [72], the control data memory [73], the print data memory [74], the data input/output interface [75], and the inkjet driving-control circuit [76].

[0024]

The central control circuit [71] has a CPU operated by a preset program; accesses the rotation control circuit [72], the

control data memory [73], the print data memory [74], the data input/output interface [75], and the TOC information memory [64] following the switch signals of the switch panel [23]; compiles a control data based on the print data from the data input/output interface [75]; and drives the inkjet device [24] to print circular lined characters on the label printing surface of the optical disk [1] through the inkjet driving circuit [76] following the control data.

[0025]

The data input/output interface [75] has a well-known magnetic floppy disk drive unit, an optical disk drive unit, and a connection interface with a memory card.

[0026]

The operation and the procedure of generating print data are described in detail hereafter. After the information-recording unit [6] completes recording the information into the optical disk [1], the switch [5] is toggled so that the label print unit [7] controls the rotation of the spindle motor [3]. The optical disk [1] is then rotated at the rotational speed suitable for the label printing, establishing the condition for printing a label.

[0027]

For carrying out a label-printing routine, it is necessary to input print data beforehand. The print data is an actual printing design, and it is produced by a personal computer. In

this case, a character data entered from a keyboard or character data pre-produced and stored in a magnetic floppy disk or a memory card may be used to produce data-designing character data as print data.

[0028]

The print data is then stored on a magnetic floppy disk or a memory card, and the stored print data is read out by the label-printing unit [7] through the data input/output interface [75]. The print data, which is read out by the label-printing unit [7], is stored into the print data memory [74] through the central control circuit [71]. The print data, stored in the print data memory [74] by the CPU of the central control circuit [71] following the switching operation of the switch panel [23], is converted into control data for controlling the operation of the inkjet unit [4], and then stored into the control data memory [73].

[0029]

When control data is generated from print data, the control data, which drives the inkjet device [24] so that it spirally prints the print data, is produced as shown in Fig. 3. The control data generated in the aforementioned manner is transmitted from the control data memory [73] to the inkjet driving-control circuit [76] through the central control circuit [71], and the inkjet driving-control circuit [76] drives the

inkjet unit [24] according to the input control data. Then the label 1a of the circular lined characters shown in Fig. 4 is printed out on the upper surface of the optical disk [1].

[0030]

Since this embodiment fixes the inkjet nozzle [24a] for printing out circular lined characters as described above, the inkjet device [24] may be more simplified than the prior art, and the main body [2] may be smaller. Since the nozzle [24a] is fixed, high quality printing of circularly line characters without jittering may be achieved. Furthermore, like the prior art, this embodiment requires no form for each label design; hence, it is easy to produce a small number of labels or different design of labels, and an optical disk with a label of an original design may be offered at a low cost. Furthermore, it is possible to print a label of a desired design in a series of manufacturing processes without taking a long time while information is being recorded.

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[0031]

Because the aperture part [25] is additionally formed, it is easy to replace the nozzle [24a] and to fill the ink into the inkjet device [24] as well.

[0032]

Although printing data are produced by a personal computer in this embodiment, the label-printing device may integrate the

printing data function.

[0033]

This embodiment configured a monochrome printing device but it is not restrictive; a multicolor printing device is an obvious extension of this invention and it is easily achieved.

Furthermore, a plurality of print data sets may be stored in the print data memory [74] in advance to select one manually or automatically.

[0034]

It is also possible to reduce the manufacturing time by setting a label-printing routine by toggling the switch [5] automatically after completing information-recording into the optical disk [1].

[0035]

This embodiment configures an information recording device for an optical disk with the label printing function; however, it is possible to configure a label-printing device of a stand-alone type by separating the pickup [3] [sic. 4] and the information recording unit [6]. Furthermore, in a label-printing device of a stand-alone type, the printing object is not restricted with the optical disk.

[0036] [Effect of this Invention]

According to the disk label-printing device described in Claim 1 of this invention, the inkjet nozzle is fixed for

printing out only circular lined characters; hence, the inkjet device may be more simplified than the prior art, the main body of the device may be smaller, and high quality character printing may be achieved. Furthermore, this invention does not require a form for each label design, and thus it is easy to produce or modify a design for a small number of labels or a single label, and a disk with a label of an original design may be offered at a low cost.

[0037]

According to Claim 2 of this invention, this invention easily replaces the inkjet nozzle through the aperture part for maintenance, and easily refills the ink into the inkjet device while a label is being printed out.

[0038]

According to the optical disk information-recording device described in Claim 3 of this invention, the inkjet nozzle is fixed for printing out only circular lined characters; hence, the inkjet device may be more simplified than the prior art, the main body of the device may be smaller, and high quality character printing is achieved. Furthermore, this invention does not require a form for each label design, and thus it is easy to produce or modify a design for a small number of labels or a single label, and a disk with a label of an original design may be offered at a low cost. In addition, this optical disk

information recording device implements an advantage where label-printing and recording information may be carried out simultaneously in a series of manufacturing processes without taking a long time.

[0039]

According to Claim 4 of this invention, this invention easily replaces the inkjet nozzle through the aperture part for maintenance, and easily refills the ink into the inkjet device while a label is being printed.

[Brief Description of the Figures]

[Figure 1] shows an outlook of an optical disk information-recording device of an embodiment of this invention.

[Figure 2] shows a block diagram of an optical disk information-recording device of an embodiment of this invention.

[Figure 3] explains drive-control of the inkjet device on the embodiment of this invention.

[Figure 4] shows an example of label design in the embodiment of this invention.

[Explanation of Keys]

1... Optical disk; 2... Information-recording device main body; 21... Tray; 22... Transfer slot; 24... Inkjet device; 24a... Nozzle; 24b... Support pillar; 25... Aperture part; 25a... Open/close lid; 3... Spindle motor; 4... Pickup; 5... Switch; 6... Information-recording unit; 61... Information-recording

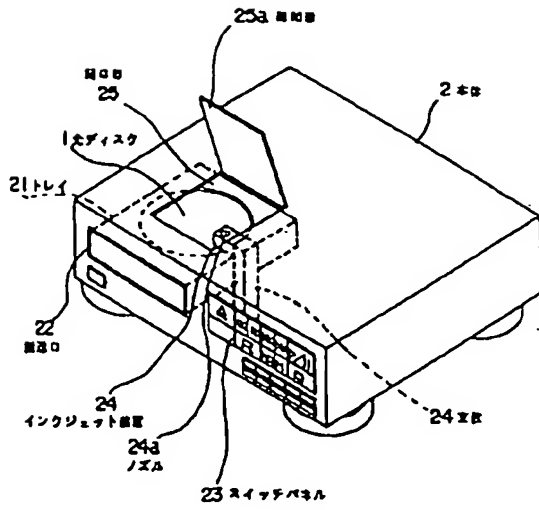
control circuit; 62... Information input interface; 63...

Rotation control circuit; 64... TOC information memory; 7...

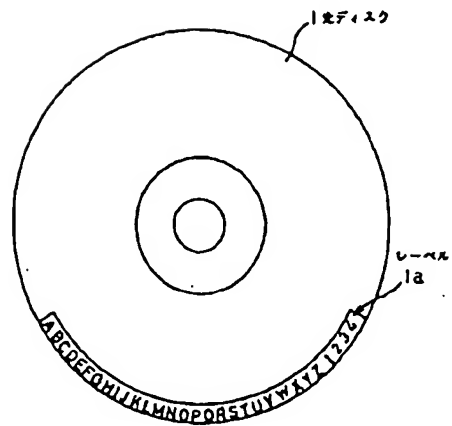
Label-printing unit; 71... Central control circuit; 72...

Rotation control circuit; 73... Control data memory; 74... Print
data memory; 75... Data input/output interface.

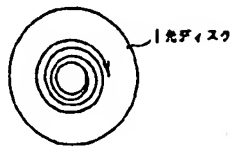
〔図1〕 [Figure 1]



〔図4〕 [Figure 4]



〔図3〕 [Figure 3]



[図2] [Figure 2]

